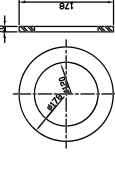
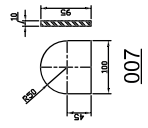
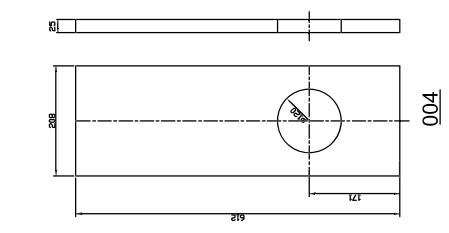
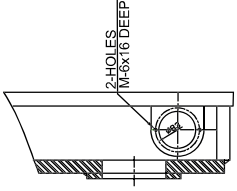
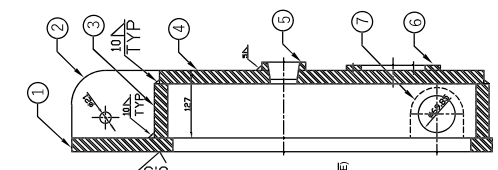
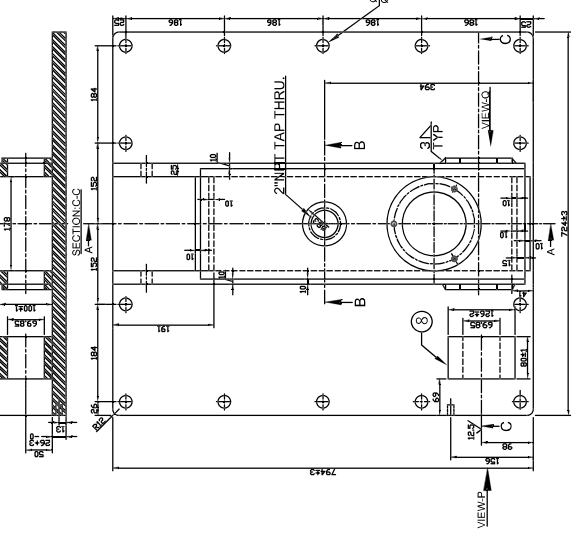


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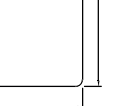
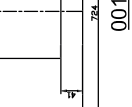
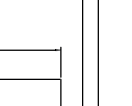
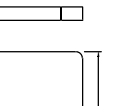
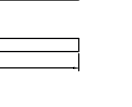
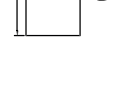
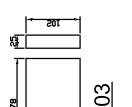
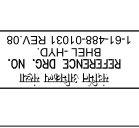
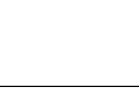
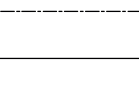
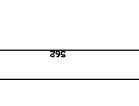
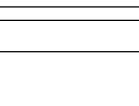
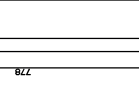
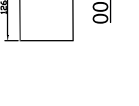
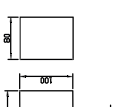
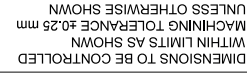
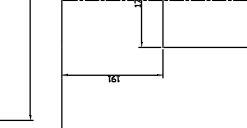
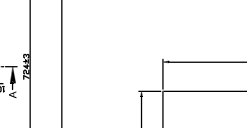
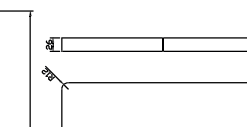
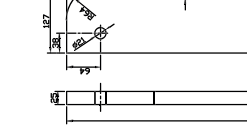
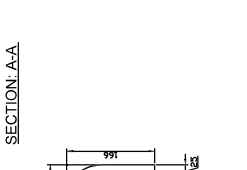
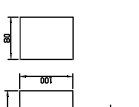


आवृत्ति पर नियंत्रित किया जाना चाहिए।  
 DIMENSIONS TO BE CONTROLLED  
 WITHIN LIMITS AS SHOWN  
 MACHINING TOLERANCE ±0.25 mm  
 UNLESS OTHERWISE SHOWN  
 NON-MACHINING TOLERANCE ±0.5 mm

1-61-488-01031 Rev.08  
 REFERENCE DRG. NO.  
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Rev. No.: 00  
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Issue no: 01

## WELDING & PAINTING PROCEDURE

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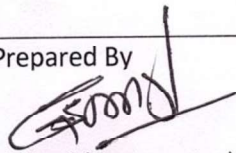
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| 04          | Welding Procedure   | 00               | 04.07.19          |
| 05          | Painting Procedure  | 00               | 04.07.19          |

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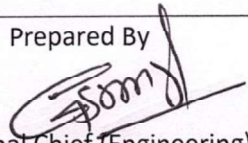
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## 2.0 RECORD OF REVISIONS

| Revision Date | Section No. | Revision No. | Clause No. | Nature of Changes                          |
|---------------|-------------|--------------|------------|--|
| 04.07.19      | All         | 00           | --         | Updation in line with merger of CS-FP & IP |

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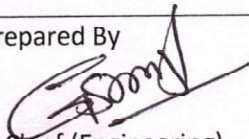
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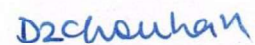
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WELDING & PAINTING PROCEDURE

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#### 4.1 WELDING PROCEDURE:

4.1.1 The welding procedure outlined will be followed to ensure uniform and good quality welding.

4.1.2 The welding must be Arc / Flux cored after maintaining proper fit up.

4.1.3 The material specification of welding electrodes/Flux core wire to be as below:

A **Electrode: MS - E 6013**

Arc welding (2.5 mm , 3.15 mm or 4.0 mm):- make

|                                |                |                    |   |
|--------------------------------|----------------|--------------------|---|
| Advani- Oerlikon:<br>Overcords | D&H :<br>Medio | Rockweld:<br>V-117 | I.O.L/ESAB:<br>Vordian/Ferrospeed<br>plus |
|--------------------------------|----------------|--------------------|---|

**Electrode: SS - E 7018**

Arc welding ( 2.5 mm , 3.15 mm or 4.0 mm ) : - make

|                               |                         |                                   |
|-------------------------------|-------------------------|-----------------------------------|
| Advani-Oerlikon:<br>Supercito | D & H :<br>Supra Therme | ESAB:<br>Ferro Weld-2 / ESAB 36 H |
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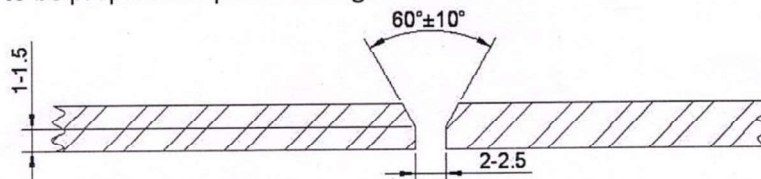
**B MIG WELDING:- (Flux core wire 1.6 mm or 1.8 mm)**

Solid wire core for MS -- ER 70S-6

For SS-- ER-308 L /ER309 L

Make- Ador /D&H/Esab/D&H Sechron/Cotmac

4.1.3 Edges to be prepared as per following sketch:



4.1.4 Root pass welding to be carried out buy using 2.5 mm welding electrodes ,further filling may be done either by 3.15 mm or 4.0 mm electrodes/Root pass welding to be carried out by 1.2 mm to 1.8 mm dia flux core wire ,further filling by 1.2 mm to 1.8 mm flux core wire.

4.1.5 Ensure root weld is uniform and penetration is proper.

4.1.6 Between two passes, remove slag and clean weld surfaces.

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*[Signature]*

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*[Signature]*

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WELDING & PAINTING PROCEDURE

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4.1.7 In case of undercut grind the weld surface smooth and fill up with 2.5 mm welding electrode/wire core.

4.1.8 Employ down hand method for welding.

#### 4.2 CHECK POINTS:

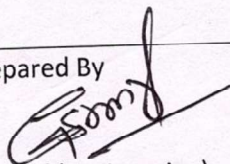
Audit checks are conducted for the quality of welding of every cerialin item. The Die Penetration test is to be carried as per E&D:331 after each root pass.

The visual examination of welding is to be carried out as per detail below:

1. The weld shall be free of cracks.
2. The face of weld shall be flush with the surface of base metal & weld shall merge smoothly with base metal. Undercut shall not exceed 1 mm & welding reinforcement shall not exceed 3 mm.
3. The root of weld shall be inspected & there shall be no evidence of cracks, incomplete fusion or inadequate joint penetration.
4. The weld shall be free from overlap.
5. The weld shall be free from accumulated slag the sum of the greatest dimensions of which shall not exceed 6 mm.
6. Grinding is not allowed on weld bead.
7. Grinding of all gas cut portion to be ensured ( including lifting lug )

**4.3 Welder Qualification:** Welder qualification test to be done strictly for each welder as per AWS D-1.1 by a third party NABL accredited lab once in a year.

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WELDING & PAINTING PROCEDURE

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## 5. PAINTING PROCEDURE:

5.1. This procedure covers the requirements of primer and Final paint for M. S. Casing for in-land applications/costal region/export

5.2. This procedure specifies the painting requirements to provide adequate surface protection.

### 5.3. SPECIFICATION OF PRIMER/PAINT:-

| Type of paint   | Specification                                 | Make                        |
|---|---|-----------------------------|
| Alkyd Red Oxide Zinc Phosphate Primer   | As per IS:12744 -DFT 30 Mic /coat             | Berger ,Asian Paint , Dulux |
| General Purpose Aluminium Paint   | As per IS:2339-DFT 30 mic/coat                | Berger ,Asian Paint , Dulux |
| For costal region /Export / Special items ,paint type to be specified by the customer | As per specification provided by the customer | Berger ,Asian Paint , Dulux |

### SURFACE PREPARATION:-

5.3.1. Surface of component shall be thoroughly cleaned before the application of primer paint by either Power Tool cleaning (SSPC-SP3) or Abrasive Blast cleaning. The surface shall be free from dust, rust, weld, slag, spatters, oil, grease etc.

### 5.4. APPLICATION OF PAINT:-

5.4.1. Surface prepared as mentioned above shall be applied with one coat of Alkyd Red Oxide Zinc Phosphate primer (as per IS:12744) where no special primer is mentioned for M.S. Casing.

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Functional Chief (Engineering)

Approved By

D. Chauhan  
HOD (Engineering)

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WELDING & PAINTING PROCEDURE

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#### 5.5. GENERAL:-

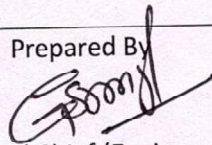
- 5.5.1. Paint make Berger /Dulux / Asian shall be used as supplied by the supplier without any addition of thinner.
- 5.5.2. Primer shall be thoroughly stirred before application. Primer can either be applied on surface by brushing or spraying using compressed air uniformly. The thickness of the primer shall not be less than 30 microns/coat (where no other specifications are mentioned).
- 5.5.3. Adequate drying time is to be allowed after each coat before next coat of paint.
- 5.5.4. No painting is required in case of Stainless Steel components, unless otherwise specified.
- 5.5.5. For all machined components, rust preventive fluids shall be used (where no other specifications are mentioned).
- 5.5.6. Rusting of received material at BHEL IP will be treated as use of poor paint / process and the same will be outrightly rejected or repainting will be done on the risk and cost of supplier on the discretion of BHEL.

#### 5.6. Inspection:-

- 5.6.1. Surface preparation, primer coating shall be checked at appropriate stages by executing agency before proceeding to next operation.

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Prepared By



Functional Chief (Engineering)

---

Approved By



HOD (Engineering)

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Rev. No.: 00

Date of revision: 04.07.2019

**DYE PENETRATION TEST PROCEDURE**

**BHEL FSIP JAGDISHPUR**

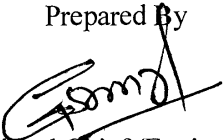
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| 04          | Dye Penetration Test Procedure | 00            | 04.07.19       | 3            |

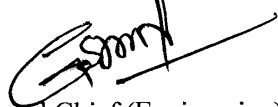
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| DYE PENETRATION TEST PROCEDURE                       |   |

## 2.0 Record of revision

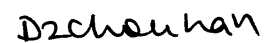
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|----------|--------------|-----------------|---|
| 04.07.19 | 00           | All             | Updated in accordance with the merger of CS-FP & IP |

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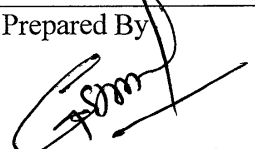
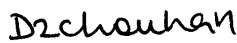


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| DYE PENETRATION TEST PROCEDURE                       |   |

#### 1.0 Scope:

This procedure shall be used for colour contrast (visible dye) method of liquid penetrant examination of materials for detecting discontinuities in welded joints of MS casings/ rings/ Cones.

#### 2.0 METHOD AND MATERIALS:

A visible dye penetrant which can be easily seen in natural light or in artificial light shall be used (Solvent removable penetrant and Non Aqueous suspended type developer) •

#### 3.0 SURFACE PREPARATION:

3.1 In general, satisfactory results may be obtained in the as welded, as forged, as cast and as rolled condition. Machining and grinding may be required when surface irregularities would otherwise mask the indications of unacceptable discontinuities.

3.2 Prior to penetrant examination the surface shall be carefully examined. Surface shall be free from dirt, grease, lint, scale, welding flux, spatters or any extraneous matter which may be tend to cover. Surface openings or otherwise interfere with proper evaluation of test result.

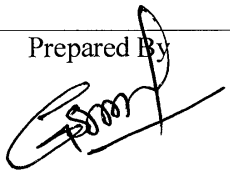
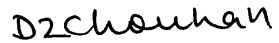
3.2.1 Adjacent areas to a minimum length of 25mm on either side of the weld shall be prepared as specified in 3.2.

3.2.2 Surfaces shall be thoroughly cleaned using acetone before applying penetrant.

3.2.3 Surface shall be dried at least 3 minutes prior to Application of Penetrant.

#### 4.0 PENETRATION APPLICATION

4.1 The penetrant shall be applied by dipping, brushing or spraying. If the penetrant is applied by spraying, using compressed air. type apparatus, a filter shall be placed at the air inlet to preclude contamination of penetrant by oil, water or dirt that might have collected in the air lines.

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| Prepared By<br> | Approved By<br> |
| Functional Chief (Engineering)   | HOD (Engineering)  |

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| BHARAT HEAVY ELECTRICALS LIMITED<br>FSIP, JAGDISHPUR | Document No. : E&D: 331<br>Section No. : 04<br>Section Rev. No.: 00<br>Date of Rev. : 04.07.19<br>Page : 2 of 3 |
| DYE PENETRATION TEST PROCEDURE                       |   |

- 4.2 The temperature of the penetrant and the surface of the part to be processed shall not be below 16°C nor above 52°C throughout the examination period.
- 4.3 Minimum penetration time shall be 15 minutes.

#### 5.0 EXCESS PENETRANT REMOVAL:

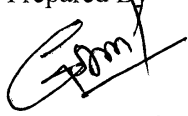
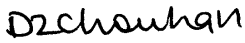
- 5.1 After the penetrant time specified above in column 4.3 has elapsed any penetrant remaining on the surface shall be removed, taking care to minimize removal of penetrant from the discontinuities.
- 5.2 Penetrant shall be removed by wiping with a clean lint free dry cloth. The operation should be repeated until most traces of penetrants are removed. A clean dry cloth moist with solvent (cleaner) shall then be used to wipe the surface lightly. Extreme care shall be taken to prevent over cleaning as over cleaning can and does remove penetrant from discontinuities. Under no circumstances cotton waste shall be used for removing penetrant.

#### 6.0 DEVELOPER APPLICATION:

- 6.1 After cleaning, developer shall be applied by spraying, prior to applying the developer it must be thoroughly agitated to ensure adequate dispersion of the suspended particles. A uniform thin coating of developer must be applied. Conversely avoid the formation of parts of developer in the cavities since heavy coatings may mask indication.
- 6.2 Allow 5 minutes for the developer to dry before the start of inspection and a maximum of 30 minutes to complete the interpretation of results of the examination.

#### 7.0 EVALUATION OF INDICATION:

- 7.1 Discontinuities open to the surface will be indicated by the bleeding out of the penetrant. Localized surface imperfection which occur from machining marks, or surface irregularities shall be ignored as non-relevant indication.
- 7.1.1 Non—relevant indication and broad areas of pigmentation, which would mask indication of defects, shall be reprocessed and retested.
- 7.2 Relevant indications are those, which result from discontinuities open to surfaces. Linear indications are those indications in which the length is more than three times the width. Rounded indications are circular or elliptical with length lesser than three times the width.

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| Prepared By<br><br>Functional Chief (Engineering) | Approved By<br><br>HOD (Engineering) |
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| BHARAT HEAVY ELECTRICALS LIMITED<br>FSIP, JAGDISHPUR<br><br>DYE PENETRATION TEST PROCEDURE | Document No. : E&D: 331<br>Section No. : 04<br>Section Rev. No.: 00<br>Date of Rev. : 04.07.19<br>Page : 3 of 3 |
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**8.0 ACCEPTANCE CRITERIA:**

No cracks are permitted on any surface.


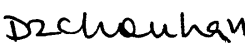
**8.1 WELDS :**

8.1.1 The following indications are not acceptable:

- a) Only indications with major dimensions greater than 1.6mm shall be considered as relevant.
- b) Unless otherwise specified the following relevant indications are unacceptable:
  1. Any cracks or linear indications.
  2. Rounded indications with dimensions greater than 4.8mm.
  3. Four or more rounded indications in a line separated by 1.6mm or less edge to edge.
  4. Ten or more rounded indications in any 3870 Sq. mm (6 Sq. in) of surface with the major dimension of this area not to exceed 152 Sq. mm with the area taken in the most unfavourable location relative to the indications being evaluated.

**9.0 POST EXAMINATION CLEANING:**

- 9.1 As soon as practical, after completion of the penetrant examination the completed parts shall be cleaned to remove residual penetrants materials.

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| Prepared By<br><br>Functional Chief (Engineering) | Approved By<br><br>HOD (Engineering) |
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| SL. NO   |                                 | MANUFACTURER'S NAME AND ADDRESS:<br>AS PER PO/RC   |       | REFERENCE QUALITY PLAN       |   |                     |                    |  |        | TO BE FILLED IN BY BHEL |  |
|----------|---------------------------------|--|-------|------------------------------|---|---------------------|--------------------|--|--------|-------------------------|--|
|          |                                 |  |       | ITEM /EQUIPMENT :            | SIGN. OF MFGR                                 | PAGE: 1 OF 2        | REVIEWED BY:       | APPROVED BY:                             |        |                         |  |
| COMONENT |                                 | CHARACTERISTICS & OPERATIONS   | CLASS | TYPE OF CHECK                | QUANTUM OF CHECK                              | REFERENCE DOCUMENT# | ACCEPTANCE NORMS   | FORMAT OF RECORD                         | AGENCY | REMARKS                 |  |
|          |                                 |  |       |                              | M   | C                   |                    |  | M      | C                       |  |
| 1.       | 2.                              | 3.   | 4.    | 5.                           | 6.  | 7.                  | 8.                 | 9.                                       | 10.    | 11.                     |  |
| 1.0      | Steel Plates for Casing & Rings | a) Chemical Composition<br>b) Mechanical Properties  | Maj.  | Chemical                     | 1 sample/lot                                  | IS:2062 (Gr.A)      | IS:2062 (Gr.A)     | MTC / Test Report                        | P      | V                       | Correlated test certificate and inspection reports to be maintained by Vendor.<br>Mechanical test shall be witnessed by BHEL in case material purchased & used without correlated MTC. |
| 2.0      | Fabricated Casing               | a) Suitability of welding procedure Specification<br>b) Capability of welder in adopting welding procedure | Maj.  | Procedure qualification test | Once  | E&D:330 Section 04  | E&D:330 Section 04 | Welding procedure & Qualification record | P      | W                       | Qualification test of welder done at BHEL's/ Vendor's work may be witnessed by BHEL.   |
|          |                                 |  | Maj.  | Procedure qualification test | Periodically once in one year for each welder | E&D:330 Section 04  | E&D:330 Section 04 | Qualification certificate                | P      | W                       | Records shall be maintained.   |

**LEGEND:**  
M: MANUFACTURER C: BHEL, P: PERFORM W: WITNESS AND V: VERIFICATION (AS APPROPRIATE) CHP: BHEL SHALL IDENTIFY IN COLUMN "C" AS "W".  
**Note:# BHEL Inspection Engineer to check, approval date/ revision no. of reference documents at the time of Inspection**

| MANUFACTURER'S NAME AND ADDRESS:<br>AS PER PO/RC |                           | REFERENCE QUALITY PLAN   |  |   |   |   |  |  |   |   |  | TO BE FILLED IN BY BHEL |         |
|--|---------------------------|--|--|---|---|---|--|--|---|---|--|-------------------------|---------|
|  |                           | ITEM /EQUIPMENT :<br>METAL PART (CASING) FOR CERALIN LINED ITEMS   |  | SQP NO.:<br>CER/2020-21/02  | REV. NO.: 00  | DATE : 07.09.20   | SIGN. OF MFRGR   | PAGE: 2 OF 2   | REVIEWED BY:  | APPROVED BY:  | AGENCY   |                         | REMARKS |
| SL. NO   | COMPONENT                 | CHARACTERISTICS & OPERATIONS   | CLASS  | TYPE OF CHECK   | QUANTUM OF CHECK  | REFERENCE DOCUMENT#   | ACCEPTANCE NORMS   | FORMAT OF RECORD   | M   | C   | AGENCY   | REMARKS                 |         |
| 1.   | 2.                        | 3.   | 4.   | 5.  | 6.  | 7.  | 8.   | 9.   | 10.   | 11.   |  |                         |         |
| 2.0  | Fabricated Casing (Cont.) | c) Welding<br>i) Fit up<br>ii) Root run<br><br>d) Liquid penetrate inspection for weld joints<br>i) Butt Joint<br>ii) Fillet Joint<br><br>e) Welding Quality & Finished<br><br>f) Dimension<br><br>g) Painting | Maj.<br><br>Maj.<br><br>Maj.<br><br>Maj.<br><br>Maj. | Visual<br>Visual<br><br>NDT<br><br>Visual<br><br>Physical<br><br>Physical | 100%<br>100%<br><br>100%<br>10%<br>100%<br><br>100%<br><br>100%<br><br>100% | Drawing<br>Drawing<br><br>E&D:331 Section 04<br><br>E&D:330 Section 04<br><br>Drawing<br><br>E&D:330 Section 05<br><br>As Above<br><br>QR/20-21 Rev00 | Drawing<br>Drawing<br><br>E&D:331 Section 04<br><br>E&D:330 Section 04<br><br>Drawing<br><br>E&D:330 Section 05<br><br>- | Inspection Report QAC 4301 & 4302<br><br>Inspection Report<br><br>Inspection Report<br><br>Inspection Report QAC 4306<br>Inspection Report QAC 4307<br><br>As Above<br><br>- | P<br>P<br><br>P<br><br>P<br><br>P<br><br>P<br><br>P | V<br>V<br><br>W<br><br>W<br><br>W<br><br>W<br><br>V | BHEL shall verify the record at sub-contractor works and carryout the check on min 10% of samples selected at random for the test. If any sample fails, 100% of the lot shall be checked.<br><br>The evaluation of LPI of welded joints is to be carried out by persons having min ASNT Level-II Qualification.<br><br>Welder's identification shall be recorded.<br><br>BHEL inspector may seek records for compliance of its quality requirement document. |                         |         |
| 3.0  | Documentation             | Review & Record of Inspection Reports  | Maj.   | Review of document  | 100%  | As Above  | -  | As Above   | P   | V   |  |                         |         |
| 4.0  | Quality Requirement       | Complete quality requirement   | Maj.   | Review of document  | 100%  | QR/20-21 Rev00  | -  | -  | P   | -   |  |                         |         |

**LEGEND:**  
M: MANUFACTURER C: BHEL, P: PERFORM W: WITNESS AND V: VERIFICATION (AS APPROPRIATE) CHP: BHEL SHALL IDENTIFY IN COLUMN "C" AS "W".  
**Note: # BHEL Inspection Engineer to check, approval date/ revision no. of reference documents at the time of Inspection**



**INSPECTION REPORT OF CASING FOR P.F. BEND/FIE/MOE**


FSIP - JAGDISHPUR

Format No. : QAC- 4301

|              |  |  |  |  |  |  |  |  |  |  |  |                     |  |  |  |  |  |  |  |  |  |  |  |
|--------------|--|--|--|--|--|--|--|--|--|--|--|---------------------|--|--|--|--|--|--|--|--|--|--|--|
| SUPPLIER     |  |  |  |  |  |  |  |  |  |  |  | DRAWING NO.:        |  |  |  |  |  |  |  |  |  |  |  |
| CONTRACT No. |  |  |  |  |  |  |  |  |  |  |  | P.O.No.:            |  |  |  |  |  |  |  |  |  |  |  |
| ITEM:        |  |  |  |  |  |  |  |  |  |  |  | DATE OF INSPECTION: |  |  |  |  |  |  |  |  |  |  |  |
| AXIAL SHIFT  |  |  |  |  |  |  |  |  |  |  |  | RADIAL SHIFT        |  |  |  |  |  |  |  |  |  |  |  |
| O.D.         |  |  |  |  |  |  |  |  |  |  |  | OUTER               |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | INNER               |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | OUT OF SQUARENESS   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | A                   |  |  |  |  |  |  |  |  |  |  |  |
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| AHS          |  |  |  |  |  |  |  |  |  |  |  | 5                   |  |  |  |  |  |  |  |  |  |  |  |
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| TES          |  |  |  |  |  |  |  |  |  |  |  | 2                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 3                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 4                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 5                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 6                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 7                   |  |  |  |  |  |  |  |  |  |  |  |
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| TES          |  |  |  |  |  |  |  |  |  |  |  | 3                   |  |  |  |  |  |  |  |  |  |  |  |
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| AHS          |  |  |  |  |  |  |  |  |  |  |  | 3                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 4                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 5                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 6                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 7                   |  |  |  |  |  |  |  |  |  |  |  |
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| AHS          |  |  |  |  |  |  |  |  |  |  |  | 2                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 3                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 4                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 5                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 6                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 7                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 1                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 2                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 3                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 4                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 5                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 6                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 7                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 1                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 2                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 3                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 4                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 5                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 6                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 7                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 1                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 2                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 3                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 4                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 5                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 6                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 7                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 1                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 2                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 3                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 4                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 5                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 6                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 7                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 1                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 2                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 3                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 4                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 5                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 6                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 7                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 1                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 2                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 3                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 4                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 5                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 6                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 7                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 1                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 2                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 3                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 4                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 5                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 6                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 7                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 1                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 2                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 3                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 4                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 5                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 6                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 7                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 1                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 2                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 3                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 4                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 5                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 6                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 7                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 1                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 2                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 3                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 4                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 5                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 6                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 7                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 1                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 2                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 3                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 4                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 5                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 6                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 7                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 1                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 2                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 3                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 4                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 5                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 6                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 7                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 1                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 2                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 3                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 4                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 5                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 6                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 7                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 1                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 2                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 3                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 4                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 5                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 6                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 7                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 1                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 2                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 3                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 4                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 5                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 6                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 7                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 1                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 2                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 3                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 4                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 5                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 6                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 7                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 1                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 2                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 3                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 4                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 5                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 6                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 7                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 1                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 2                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 3                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 4                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 5                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 6                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 7                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 1                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 2                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 3                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 4                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 5                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 6                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 7                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 1                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 2                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 3                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 4                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 5                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 6                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 7                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 1                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 2                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 3                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 4                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 5                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 6                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 7                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 1                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 2                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 3                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 4                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 5                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 6                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 7                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 1                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 2                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 3                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 4                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 5                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 6                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 7                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 1                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 2                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 3                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 4                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 5                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 6                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 7                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 1                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 2                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 3                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 4                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 5                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 6                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 7                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 1                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 2                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 3                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 4                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 5                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 6                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 7                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 1                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 2                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 3                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 4                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 5                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 6                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 7                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 1                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 2                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 3                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 4                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 5                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 6                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 7                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 1                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 2                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 3                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 4                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 5                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 6                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 7                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 1                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 2                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 3                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 4                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 5                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 6                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 7                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 1                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 2                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 3                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 4                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 5                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 6                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 7                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 1                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 2                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 3                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 4                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 5                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 6                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 7                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 1                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 2                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 3                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 4                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 5                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 6                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 7                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 1                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 2                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 3                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 4                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 5                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 6                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 7                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 1                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 2                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 3                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 4                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 5                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 6                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 7                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 1                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 2                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 3                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 4                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 5                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 6                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 7                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 1                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 2                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 3                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 4                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 5                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 6                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 7                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 1                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 2                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 3                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 4                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 5                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 6                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 7                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 1                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 2                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 3                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 4                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 5                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 6                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 7                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 1                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 2                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 3                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 4                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 5                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 6                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 7                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 1                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 2                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 3                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 4                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 5                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 6                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 7                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 1                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 2                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 3                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 4                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 5                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 6                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 7                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 1                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 2                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 3                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 4                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 5                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 6                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 7                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 1                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 2                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 3                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 4                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 5                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 6                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 7                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 1                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 2                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 3                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 4                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 5                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 6                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 7                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 1                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 2                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 3                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 4                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 5                   |  |  |  |  |  |  |  |  |  |  |  |
| AHS          |  |  |  |  |  |  |  |  |  |  |  | 6                   |  |  |  |  |  |  |  |  |  |  |  |
| TES          |  |  |  |  |  |  |  |  |  |  |  | 7                   |  |  |  |  |  |  |  |  |  |  |  |



| <p align="center"><b>CHECK SHEET FOR FINAL INSPECTION OF CASING FOR PF BEND/FIE/MOE</b></p> |             |           |    |     |     |             |     |             |     |         |              |          |
|---|-------------|-----------|----|-----|-----|-------------|-----|-------------|-----|---------|--------------|----------|
| <p>Format No: QAC: 4306 Rev.00</p>  |             |           |    |     |     |             |     |             |     |         |              |          |
| <p>ITEM: _____</p>  |             |           |    |     |     |             |     |             |     |         |              |          |
| <p>DRAWING NO.: _____</p>   |             |           |    |     |     |             |     |             |     |         |              |          |
| <p>P.O. NO.: _____</p>  |             |           |    |     |     |             |     |             |     |         |              |          |
| <p>DATE OF INSPECTION: _____</p>  |             |           |    |     |     |             |     |             |     |         |              |          |
| <p>P.O. DATE: _____</p>   |             |           |    |     |     |             |     |             |     |         |              |          |
| <p>SUPPLIER: _____</p>  |             |           |    |     |     |             |     |             |     |         |              |          |
| Sl. No.   | Pattern No. | Angle (θ) | C2 | OAL | IAL | Flange O.D. |     | Flange I.D. |     | Welding | Lug Position | Painting |
|   |             |           |    |     |     | AHS         | TES | AHS         | TES |         |              |          |
| 1   |             |           |    |     |     |             |     |             |     |         |              |          |
| 2   |             |           |    |     |     |             |     |             |     |         |              |          |
| 3   |             |           |    |     |     |             |     |             |     |         |              |          |
| 4   |             |           |    |     |     |             |     |             |     |         |              |          |
| 5   |             |           |    |     |     |             |     |             |     |         |              |          |
| 6   |             |           |    |     |     |             |     |             |     |         |              |          |
| 7   |             |           |    |     |     |             |     |             |     |         |              |          |
| 8   |             |           |    |     |     |             |     |             |     |         |              |          |
| 9   |             |           |    |     |     |             |     |             |     |         |              |          |
| 10  |             |           |    |     |     |             |     |             |     |         |              |          |
| <p>Remarks: _____</p>   |             |           |    |     |     |             |     |             |     |         |              |          |
| <p>Inspected By: _____</p>  |             |           |    |     |     |             |     |             |     |         |              |          |
| <p>Approved By: _____</p>   |             |           |    |     |     |             |     |             |     |         |              |          |

| PAINTING CERTIFICATE   |            |  |                            |                 |                      |              |
|--|------------|--|----------------------------|-----------------|----------------------|--------------|
| <br>FSIP-JAGDISHPUR   |            | FORMAT NO. QAC :4307                                       |                            |                 |                      |              |
| SUPPLIER :-<br>ITEM :-<br>DATE OF INSPECTION :-  |            | P.O. NO. :-<br>DRAWING NO. :-<br>Painting reference No. :- |                            |                 |                      |              |
| Sl. No.  | PATTERN NO | PARTY IDENTIFICATION MARK                                  | PROPER SURFACE PREPARATION | VISUAL PAINTING | Required Minimum DFT | OBSERVED DFT |
| This is certified that the above MS casing are painted as per related painting scheme / Zinc Chrome Red oxide Alkyl Primer conforming to IS – 2074 and as per CE -0265.20. |            |  |                            |                 |                      |              |
| INSPECTED BY:  |            |  | REVIEWED BY:               |                 |                      |              |
| INSPECTION REMARK BY BHEL REPRESENTATIVE   |            |  |                            |                 |                      |              |

## QUALITY REQUIREMENTS

Following quality requirement is for the suppliers of M.S. Casings of BHEL FSIP, Jagdishpur. Each supplier participating in Rate Contract shall go through the Terms & Condition of this document thoroughly and participate in RC as per their facilities and 'Process Maturity' in line with this document. Supplier may has to submit documentary proof/present physically of all requirements as and when required by BHEL.

### **A. RAW Material**

#### **1. M.S.Sheet:-**

- As per BHEL Drawing
- Receipt and Issue of material used for BHEL supply shall be maintained as per enclosed Annex-A
- Correlated test certificate of material will be required along with each dispatch of M.S Casing.

#### **2. Welding Electrode:-**

- As per latest revision of document no. E&D 330 section 04.
- Photocopy of invoices of procurement of welding rod/flux core wire may be asked by BHEL against its PO to ensure type/make & quality of electrode used.

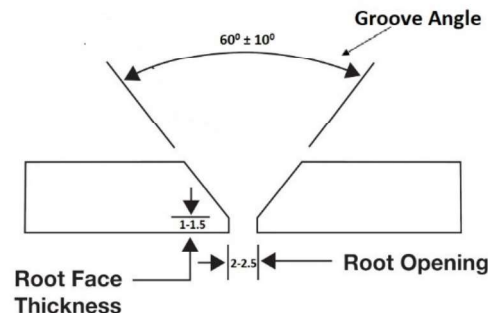
#### **3. Paint:-**

- As per latest revision of document no. E&D 330 section 05.
- Any other painting requirement will be indicated in drawing /painting scheme. It will be provided by BHEL separately with PO.
- Photocopy of invoices of procurement of paint may be asked by BHEL against their PO to ensure quality & make of paint used.

### **B. Fabrication/In-Process**

#### **1. Fabrication of M.S.Casing:**

- As per BHEL Document E&D 306 (Latest revision) and BHEL Drawing.
- Proper fit-up is to be maintained as below:



#### **2. Welder Qualification:**

- Once in every Year for each welder to be done strictly as per AWS D-1.1 by a third party NABL Accredited Lab. On lack of valid welder qualification certificate Casing manufacturing may be hold by BHEL until submission of the same. BHEL may witness welder qualification.

**3. Welding/Hard facing: (Strictly as per E&D: 330)**

- Proper Penetration Required
- No Grinding on Weld bead allowed
- Grinding of all gas cut portion to be ensured (including lifting lug)

**4. Machining:**

- Surface roughness of 6.3 micron or as specified in drawing to be achieved at complete machining portion.
- **Grinding/welding is strictly prohibited on machined portion.**

**5. Painting: As per BHEL Document E&D: 330 (Latest revision) & BHEL Drawing**

- Power Tool cleaning (SSPC-SP3) or Abrasive Blast cleaning for removal of dust, rust, weld, slag, spatters, oil, grease etc. before painting is must.
- No thinner to be added in paint.
- Rusting of received material at BHEL FSIP will be treated as use of poor paint/process and the same will be out rightly rejected or Repainting will be done on the risk and Cost of supplier on the discretion of BHEL.
- Any other painting requirement will be indicated in drawing / painting scheme. It will be provided by BHEL separately.

**C. Instruments for Inspection**

1. Duly spirit leveled surface plate
2. One meter Right Angle (Tri square)
3. 01 meter height gauge
4. 02 nos. Vernier Caliper, Range (0-1000 mm & 0-300 mm)
5. 02 nos. Measuring Tape, Range (0-3000mm & 0-5000mm)
6. Ultrasonic wall thickness gauge (i.e. D' meter)
7. Digital Coating thickness gauge for checking thickness of paint
8. Feeler gauge, spirit level, 01 meter scale, Plumb Bob
9. Proper Materials Handling / movement, instrument like as overhead crane/ Hydra etc
10. Digital Surface roughness gauge for checking the roughness of machined parts.
11. Hardness tester for checking the hardness of hard facing
12. Any kind of other instrument as per requirement of BHEL shall be arranged by the supplier

**All above Instrument's Calibration should be traceable to NABL/BHEL approved Lab. BHEL reserves the right to stop inspection in case of unavailability of above instruments.**

#### **D. BHEL Inspection/Audit**

1. Inspection call shall be raised by the vendor at least 1-2 days in advance by email to BHEL QC with a copy to MM having specific call number & details of items offered for inspection i.e. name of item as per PO, drawings number, variant number, stage of inspection, PO number, quantity offered, proposed date of inspection etc.
2. Call will be raised along with its dimension report actually measured and fill by vendor's QC/production at the required format of inspection. Each inspection call will have following disclaimer in the email:  
"Material is ready for inspection as per above schedule. However, only positive variation in Quantity may be there. All the calibrated Measuring instruments are available with us for the above inspection. We have ensured that casing is fabricated as per BHEL specifications. [I.e. material conforms IS: 2062 Grade A (Latest Revision). Fabrication is done strictly as per E&D: 306 and welding is carried out as per E&D: 330]. The above lot offered to you is already checked at our end and found acceptable."
3. **No items shall be dispatched without clearance by BHEL.**
4. BHEL Authorized representative/ Inspectors will have right of inspection/Audit/Photography of BHEL product at any supplier's premises without prior notice. Documentary evidence of compliance of above quality requirement shall be maintained by vendor and may be verified by BHEL.
5. In case of violation of quality requirements, BHEL Reserves the right to out rightly reject/ Hold for Rectification/Rectify at risk and cost of Supplier. BHEL also reserves the right to cancel the Purchase order or perform Risk Purchase.
6. **PDI/inspection done by BHEL at vendor's does not absolve vendor of their responsibility to supply a quality product as per specification/drawings etc. Vendor has to rectify / replace the casing if the casing is not manufactured as per drawing & discrepancy observed later after receipt at BHEL's work or at BHEL's customer site.**

Annexure-A

Vendor Name and address

Ref No.....

Date: \_ \_ / \_ \_ / \_ \_ \_ \_

M/s. BHARAT HEAVY ELECTRICALS LIMITED  
FABRICATION, STAMPING & INSULATOR PLANT  
JAGDISHPUR INDUSTRIAL AREA, DISTT. AMETHI U.P.227817

Kind Attention-

Invoice No. –

Invoice Date -

Sub: Material used against BHEL Purchase Order No. .... Dated.....

Dear Sir,

With reference to above order, we are submitting our material test certificate for following material used in manufacturing of M.S. casing.

| Sl. No. | Plate Thickness | Test Certificate No. | Opening Balance | Material Consumption | Closing Balance |
|---------|-----------------|----------------------|-----------------|----------------------|-----------------|
|         |                 |                      |                 |                      |                 |
|         |                 |                      |                 |                      |                 |
|         |                 |                      |                 |                      |                 |
|         |                 |                      |                 |                      |                 |

Authorised Signatory